NASA Exploratory Technologies for the NAS
Communications/Navigation/Surveillance Technologies
Research and Development

NExTNAS-CNS Project Overview

Bob Kerczewski – NASA Glenn Research Center

NExTNAS-CNS Workshop
20 August 2003
Cleveland, Ohio

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

PRESENTATION OUTLINE:

- *Background and Genesis of NExTNAS-CNS Ideas*
- *NExTNAS CNS Project Overview*
- *List of Proposed Subprojects*
- *Subproject Descriptions*
- *Procurement Strategies*
- *Summary*

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

PRESENTATION OUTLINE:

- *Background and Genesis of NExTNAS-CNS Ideas*
- *NExTNAS CNS Project Overview*
- *List of Proposed Subprojects*
- *Subproject Descriptions*
- *Procurement Strategies*
- *Summary*

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

BACKGROUND

- *NExTNAS is a set of Airspace Systems Program new (FY '04-08) projects to act upon the goals of the Airspace Systems Program:*
  Improve throughput, predictability, flexibility, collaboration, efficiency, and access of the NAS, while maintaining system safety, security and environmental protection
- *There are five NExTNAS Research Areas:*
  - *Advanced CNS*
  - *Wake Vortex Solutions*
  - *ATM Automation Technology*
  - *Demand Adaptive ATM*
  - *Human Measures & Performance*

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

NExTNAS-CNS Goals, Objectives and Products are based on:

- *Knowledge and experience gained by NASA Glenn from its long history of work in advanced communications technologies and more recent work in Aeronautical CNS Projects*
- *Requirements Analyses, Architecture Studies, Technology Gap Analyses*
- *Integrated CNS Technologies Conferences and Workshops*
- *Technical Interchange Meetings with the Industry and FAA*

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

Knowledge and experience gained by NASA Glenn from its long history of work in advanced communications technologies and more recent work in Aeronautical CNS Projects

- *Advanced Air Transportation Technologies (AATT)*
  - *Advanced Communications for Air Traffic Management (AC/ATM)*
- *Aviation Safety/Security Program*
  - *Weather Accident Prevention Project - Weather Information Communications (WINCOMM)*
  - *Secure Aircraft System for Information Flow (SASIF)*
- *Small Aircraft Transportation System (SATS)*
  - *Airborne Internet technology development*
- *Virtual Airspace Modeling and Simulation (VAMS)*
  - *Virtual Airspace Systems Technologies (VAST) CNS modeling*

NExTNAS-CNS Project

NASA Exploratory Technologies for the NAS

Requirements Analyses, Architecture Studies, Technology Gap Analyses

- *Advanced Air Transportation Technologies (AATT) Sponsored:*

INPUTS

SatCom Parameters

Industry Inputs

AATT F/F ConOps

Aeronautical Comm. Requirements Documents – All Known Sources

Free Flight SatCom Study (Lockheed Martin)

NAS Architecture 4.0

Advanced Applications

Next-Gen Satellites

TO-24 Comm. System Architecture Development (SAIC, et al)

Next-Gen Satellite Systems for Aero-Comm. (NEXTOR – UMd &VT)

Industry, FAA, NASA Inputs

CNS Gap Analysis (CNS Inc.)

OUTPUTS

SatCom-based Architectures

R&D Recommendations

Technology Gaps

Requirements Database

NAS Modeling

Hybrid Communications Architectures

Research Issues

Far-Term (2020) Req's & Applications

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

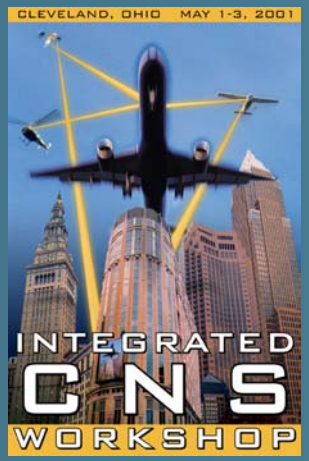
Requirements Analyses, Architecture Studies, Technology Gap Analyses

- *Advanced Air Transportation Technologies (AATT) Sponsored:*
  - *In-house modeling and simulation of VDL, ADS and satcom links*
  - *Distributed Air-Ground Traffic Management (DAG-TM)*
- *RTCA ConOps December 2002*
- *Joint Program Office Concept (in development)*
- *Boeing GCNSS Trade Studies and analyses*
- *REDAC*
  - *Aviation Communications Research & Technology Subgroup*
  - *Oceanic CNS Working Group*

NExTNAS-CNS Project

NASA Exploratory Technologies for the NAS

Integrated CNS Technologies Conferences and Workshops

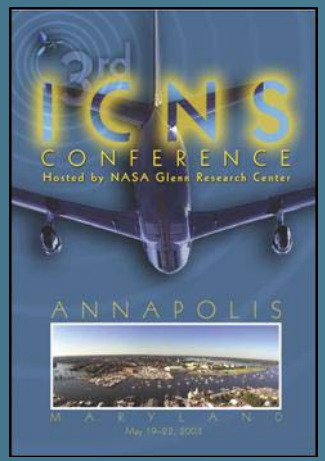


1st ICNS – May, 2001 – Key recommendations:

- Improved surveillance/situational awareness; integrated, distributed communications network; "next NEXCOM".
- R & D for frequency use and spectrum issues
- Quantify performance of comm links, esp VDL-2,3,4
- Affordability, forward compatibility early certification

2nd ICNS – May, 2002 – Key recommendations:

- Int'l coordination and joint R&D, advanced network standards for integrated CNS info infrastructure
- Next-gen surveillance; cost-effective backup for satellite navigation; Software defined radios
- Testbeds for next-gen CNS systems; continued VDL-3 research – capacity vs. long term req'ts
- Surface integrated CNS wireless-based network



3rd ICNS – May, 2003 – Key recommendations:

- Integration of CNS through network-centric architecture
- R & D to support long-term spectrum requirements, spectral efficiency, and protection of aviation spectrum
- Space-based surveillance, surveillance architecture seamlessly covering all domains, support advanced ATM
- Multi-mode, multi-application avionics

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

Technical Interchange Meetings with the Industry and Government

- *FAA – WJHTC, ASD, AND, AAR, AUA, etc*
- *DoD*
- *Eurocontrol*
- *Boeing – ATM, Phantom Works, Connexion*
- *Mitre-CAASD*
- *MIT/Lincoln Laboratory*
- *Raytheon*
- *Lockheed Martin ATM*
- *Sensis*
- *ITT Industries*
- *Honeywell*
- *Rockwell Collins*
- *ARINC*

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

NExTNAS-CNS philosophical basis and constraints

- *NASA research and development charter*
  - NASA's role is primarily research and development, rather than engineering, implementation and operations
- *NASA research support relationship with the FAA*
  - NASA has a role to provide the FAA and industry with the long-term research and development needed to guide the evolution of the NAS
- *NExTNAS-CNS's position within Airspace System Program*
  - NExTNAS planning must be cognizant of other initiatives in the planning stage (e.g. Skypath 2020) that have a more far-term research orientation
- *NExTNAS-CNS's position within Advanced CNS research plans*
  - A balance of near/mid/far term products ➔ low/mid/high TRL
  - But an emphasis on more near-term, high TRL deliverable products that will enter the system – NASA needs to show relevance and visible, implemented outcomes

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

PRESENTATION OUTLINE:

- *Background and Genesis of NExTNAS-CNS Ideas*
- *NExTNAS CNS Project Overview*
- *List of Proposed Subprojects*
- *Subproject Descriptions*
- *Procurement Strategies*
- *Summary*

NExTNAS-CNS Project

NASA Exploratory Technologies for the NAS

Goal: *Initiate the transition of today's CNS systems into a high-performance network-centric digital infrastructure to support the transformation of the National Airspace System*

Objectives:

- Identify the transitional architecture to achieve the transformational high-performance integrated CNS (ICNS) system and define the global air/ground network architecture
- Develop efficient aviation spectrum utilization and support global spectrum allocations
- Enable efficient oceanic/remote operations through improved comm and surveillance
- Increase air-ground datalink performance and capacity for terminal and en-route operations
- Improve airport surface operations via an integrated wireless CNS network

Tasks:

- Define CNS requirements for future NAS
- Develop/assess transition architectures
- Develop and evaluate system technologies for:
  - Oceanic/remote comm and surveillance
  - Space based surveillance
  - Airport surface ICNS network
- Create high-fidelity CNS evaluation capability
- Develop and evaluate technologies for:
  - Optimized VHF systems and spectrum utilization
  - Wideband terminal area communications
  - Multi-function reconfigurable avionics
  - Advanced aviation networks

Products/Deliverables:

- ICNS infrastructure transition blueprint and global digital air/ground network architecture
- Aviation spectrum plan and supporting research
- Technologies for optimization of VHF systems and improved utilization of aviation spectrum
- Affordable system for improved oceanic and remote communications and surveillance
- Prototype multi-mode, multi-application, reconfigurable avionics
- Integrated wireless airport surface CNS network
- Technologies for wideband terminal area comm
- Space-based wide-area surveillance system

NExTNAS-CNS Project

NASA Exploratory Technologies for the NAS

Goal:

Initiate the transition of today's CNS systems into a high-performance network-centric digital infrastructure to support the transformation of the National Airspace System

Objectives:

- Identify the transitional architecture to achieve the transformational high-performance integrated CNS (ICNS) system and define the global air/ground network architecture
- Develop efficient aviation spectrum utilization and support global spectrum allocations
- Enable efficient oceanic/remote operations through improved comm and surveillance
- Increase air-ground datalink performance and capacity for terminal and en-route operations
- Improve airport surface operations via an integrated wireless CNS network

NExTNAS-CNS Project

NASA Exploratory Technologies for the NAS

Tasks:

- Define CNS requirements for future NAS
- Develop/assess transition architectures
- Develop and evaluate system technologies for:
  - Oceanic/remote communications and surveillance
  - Space based surveillance
  - Airport surface ICNS network
- Create high-fidelity CNS evaluation capability
- Develop and evaluate technologies for:
  - Optimized VHF systems and spectrum utilization
  - Wideband terminal area communications
  - Multi-function reconfigurable avionics
  - Advanced aviation networks

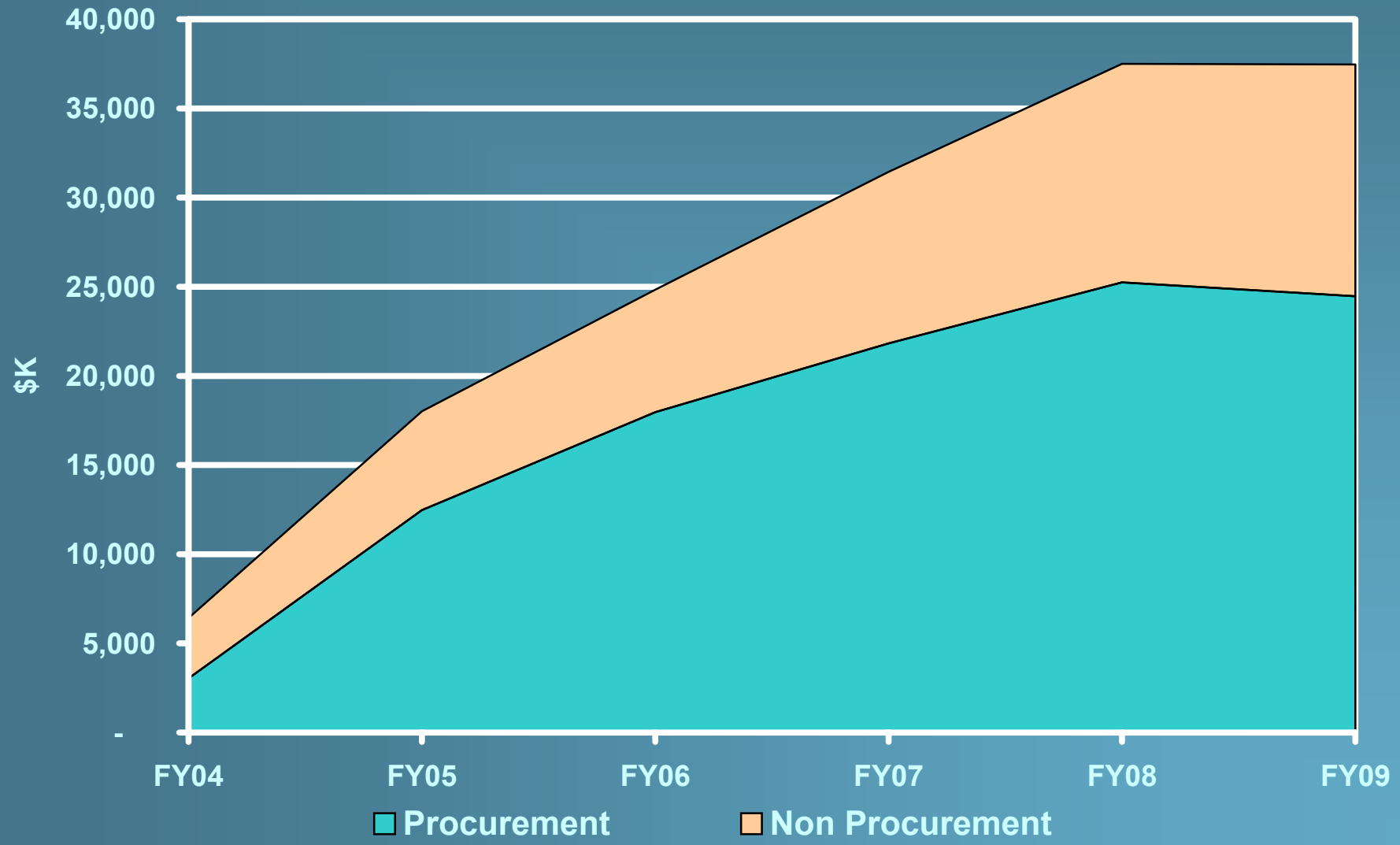
Products/Deliverables:

- ICNS infrastructure transition blueprint and global digital air/ground network architecture
- Aviation spectrum plan and supporting research
- Technologies for optimization of VHF systems and improved utilization of aviation spectrum
- Affordable system for improved oceanic and remote communications and surveillance
- Prototype multi-mode, multi-application, reconfigurable avionics
- Integrated wireless airport surface CNS network
- Technologies for wideband terminal area communications
- Space-based wide-area surveillance system analysis

NExTNAS-CNS Project

NASA Exploratory Technologies for the NAS

NExTNAS-CNS Funding Profile



NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

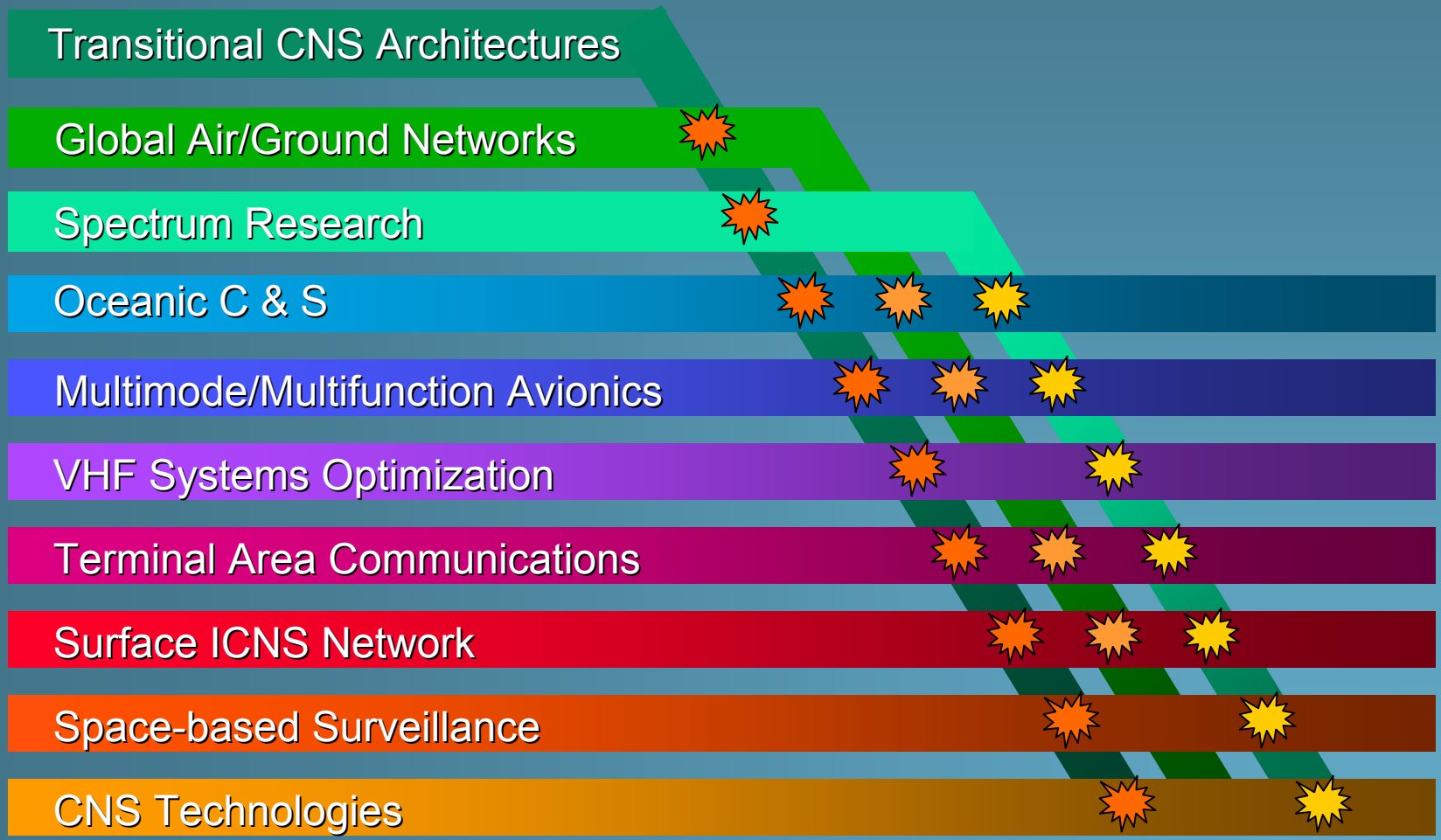
PRESENTATION OUTLINE:

- *Background and Genesis of NExTNAS-CNS Ideas*
- *NExTNAS CNS Project Overview*
- *List of Proposed Subprojects*
- *Subproject Descriptions*
- *Procurement Strategies*
- *Summary*

NExTNAS-CNS Project

NASA Exploratory Technologies for the NAS

NExTNAS-CNS Proposed Subprojects



NExTNAS-CNS Project

NASA Exploratory Technologies for the NAS

System Implementation

System/Subsystem Evaluation

Technology Development & Demonstration

Research to Prove Feasibility

Basic Technology Research

9
8
7
6
5
4
3
2
1

Technology Readiness Level (TRL)

9 Operation of Certified System
8 Certification Approved
7 Certification Standard Established
6 Draft Cert. Standard Developed
5 RTCA/SAE or Equivalent Convened
4 Application for Certification
3 Commercial Product Dev. Initiated
2 Industry R&D Funding Committed
1 Technology Transfer Initiated

Implementation Readiness Level (IRL)

NExTNAS-CNS Project

NASA Exploratory Technologies for the NAS

NExTNAS-CNS Proposed Subprojects

	Projected TRL Development Level
1. Transitional CNS Architectures	3-4*
2. Global Air/Ground Networks	4-5
3. Space-based Surveillance	3
4. Oceanic C & S	6
5. Multimode/Multifunction Avionics	6
6. VHF Systems Optimization	3-6#
7. Terminal Area Communications	3-5#
8. Spectrum Research	3-4*
9. Surface ICNS Network	6
10. CNS Technologies	3-6#

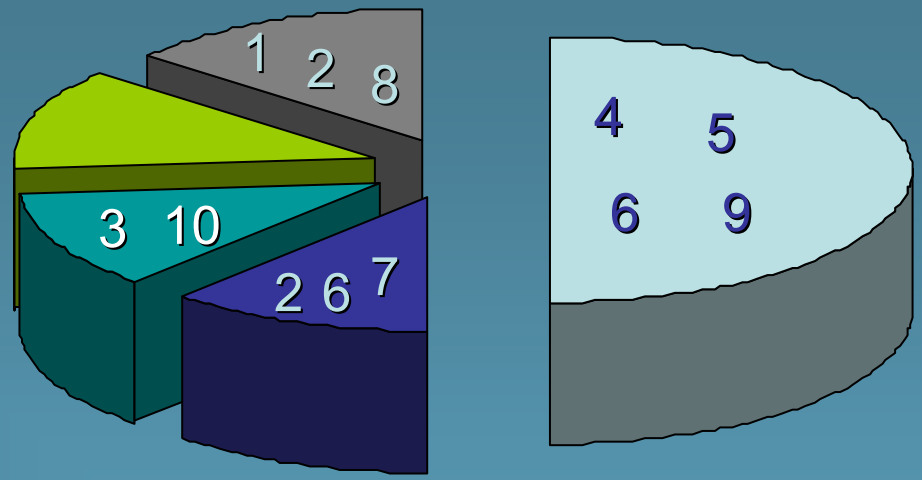
*Not easily related to TRL levels

Subproject contains several technologies which may be developed to different levels

NExTNAS-CNS Project

NASA Exploratory Technologies for the NAS

1. Transitional CNS Architectures
2. Global Air/Ground Networks
3. Space-based Surveillance
4. Oceanic C & S
5. Multimode/Multifunction Avionics
6. VHF Systems Optimization
7. Terminal Area Communications
8. Spectrum Research
9. Surface ICNS Network
10. CNS Technologies



- Near-term (TRL 6)
- Mid-Term (Trl 3-5)
- Long-Term (TRL 2-4)
- Test/Demo
- Cross-cutting

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

PRESENTATION OUTLINE:

- *Background and Genesis of NExTNAS-CNS Ideas*
- *NExTNAS CNS Project Overview*
- *List of Proposed Subprojects*
- *Subproject Descriptions*
- *Procurement Strategies*
- *Summary*

1 - Transitional CNS Architecture (TCA)

Problem Statement:

The current NAS infrastructure is composed of functionally separate and independent communications, navigation, and surveillance (CNS) systems that do not allow for sharing of data, efficient use of spectrum resources, world-wide coverage, and long term capacity requirements.

Objective:

Develop a transitional CNS architecture to enable an effective and transparent migration from the current FAA Target System Description (TSD) to the projected long term architectures.

This task will define transition strategies to meet long term NAS goals of global operations, interoperability, and seamless access to SWIM (System Wide Information Management) applications.

Product Description:

The Transitional CNS Architecture

- Transition requirements analysis
- Coordination across sub-projects
- Identification of key enabling sub-systems, technologies and components
- Development and design of hybrid, wireless and satellite based architectures
- Technology demonstrations to validate TCAs.

Schedule:

Tasks	FY 04	FY 05	FY 06	FY 07	FY 08
Rqmts. and Anal.	◆		◆		
Transition Coord & Integration	◆				◆
Architecture Dev		◆		◆	
Arch. Validation			◆		◆

2 - Global Air/Ground Network

Problem Statement:

The current NAS air/ground communications infrastructure is limited in its capabilities to deliver real-time information due to legacy, stove-piped communications architectures, limited bandwidth, and lack of system-wide interoperability and world-wide coverage.

Objective:

Develop and design a global, standards based air/ground network that will seamlessly interconnect aviation based applications and services and provide flexible access to static and mobile nodes with media independent interfaces.

This global air/ground network (GAN) will enable flexibility, system-wide interoperability, quality of service, and mobility to all users of the NAS.

Product Description:

Global Air/Ground Network Architecture

- Requirements Analysis
- Coordination across sub projects
- System designs and architectures
- Identification of enabling standards and technologies to enhance system-wide interoperability, global operations and capacity.
- Candidate technology demonstrations to validate GAN architectures.

Schedule:

Tasks	FY 04	FY 05	FY 06	FY 07	FY 08
Rqmts Analysis	◆———				
GAN Coord. & Integration	◆———	———	———	———	———▶
Architecture Dev & Simulation		◆———	———	———▶	
Architecture Valid/Demon.				◆———	———▶

3 – Space-based Surveillance

Problem Statement:

Accurate and precise aircraft position is not uniformly available in all places through present cooperative and non-cooperative surveillance capabilities. Constraints in system capacity result due to an inability to reduce aircraft separation minima.

Product Description:

Perform an assessment of space-based surveillance technologies and methodologies to determine their role in the future NAS

- Space-based radar
- Space-based multilateration
- Satellite-based ADS/TIS

Objective:

Identify space-based technologies that can provide high resolution surveillance information in all airspace with uniform coverage.
Investigate benefits and costs of technology enhancements for space-based radar, multilateration, and satellite-based ADS/TIS to improve system performance.

Schedule:

Tasks	FY 04	FY 05	FY 06	FY 07	FY 08
Reqmts. Study		◆———			
Technology Assessment			◆———	———	
Proof of Concept Components/ Demos			◆———	———	——◆

4 – Oceanic/Remote Communications and Surveillance

Problem Statement:

Oceanic and remote regions have no direct communications or surveillance capabilities, requiring aircraft spacing up to 60 nm for safe operations, resulting in major operational inefficiencies.

Objective:

Develop and demonstrate affordable component and system technologies enabling cooperative surveillance, direct pilot-controller communication, and pertinent weather information to enable safe oceanic spacing reductions to 30/30 nm with potential future reduction to 15/15 nm.

Product Description:

Develop and demonstrate an affordable prototype satellite-based system to provide communications and surveillance capabilities to enable safe aircraft spacing reduction in oceanic and remote airspace.

- Study requirements and assess candidate solutions
- R & D to mitigate technology gaps
- Develop and validate system concept
- Enable system integration with oceanic ATC
- Demonstrate and evaluate oceanic solution through flight tests

Schedule:

Tasks	FY 04	FY 05	FY 06	FY 07	FY 08
System Study	*System Tech Def'n*				
Component R&D		*Oceanic Satcom Technology Development*			
System Demos			*Oceanic C & S Pilot Tests and System Demo*		

5 – Multi-function Multi-mode Digital Avionics

Problem Statement:

- Current avionics are:
  - not interoperable with multiple CNS modes and multiple national standards;
  - expensive to upgrade and certify;
  - not easily reconfigurable for new CNS functions and/or modes; and
  - not able to provide user-selected integration of C, N, S and management functions.

Objective:

- Develop an architecture and prototype for multi-function multi-mode digital avionics (MMDA) that demonstrate:
  - interoperability with international standards and operational modes;
  - low life-cycle cost to equip/modify;
  - compliance with existing and next gen. air/ground and air/air CNS requirements & functions; and
  - comply with redundancy, certification and safety standards.

Products Description:

- Reports on assessment of MMDA capabilities and trends, certification and redundancy approach, and cost/benefit analyses
- Roadmap/transition plan for MMDA
- Architecture for MMDA
- MMDA prototype with down-selected functions and modes, developed and evaluated (TRL-6) in relevant environment to validate the architecture

Schedule:

Tasks	FY 04	FY 05	FY 06	FY 07	FY 08
Assessments & Roadmap	◆———	———◆			
Req, & Arch. Development		◆———	———◆		
Prototype Development			◆———	———	———◆
Prototype Test & Validation				◆———	———◆

6 – VHF Systems Optimization

Problem Statement:

Limited VHF communications system capacity and increasing air traffic results in congestion of the aviation VHF spectrum. The resulting voice communication errors and delayed channel access create system congestion and air traffic delays.

Product Description:

Technologies to improve efficiency of the VHF communication spectrum

- VHF antennas
- Technologies to reduce frequency guard band requirements
- Dynamic geographic frequency allocation
- VDL-3 system performance characterization

Objective:

Identify near term technologies to improve the performance and spectrum efficiency of current and emerging VHF communications systems. Select technologies with the highest potential, perform research and development to bring them to implementation stage.

Schedule:

Tasks	FY 04	FY 05	FY 06	FY 07	FY 08
Refine Tech Concepts	◆———	———			
POC Tech Development		◆———	———	———	———
Components/ Characterization			◆———	———	———

7 – Terminal Area Communications

Problem Statement:

Demand for digital air/ground (A/G) communications in the terminal area will continue to increase rapidly due to:

- Increases in air traffic density
- Advanced terminal area automation systems
- Implementation of self-separation techniques

Long range NAS operational concepts indicate a need for wideband terminal area communications that present and emerging A/G systems cannot meet.

Objective:

Initial research and development on robust, next-generation, wireless, wideband, air/ground communications technologies that will enable the quantum increase in terminal area communications needed for safe future terminal area capacity growth.

Product Description:

Next generation Terminal Area Communications System Definition

- Requirements & Technology Assessment
  - Determine communications requirements
  - Identify candidate technologies and technology gaps
- Initial System Feasibility Evaluation
  - Develop component, system proof-of-concept models
  - Proof of concept feasibility demonstration and evaluation of candidate technologies

Schedule:

Tasks	FY 04	FY 05	FY 06	FY 07	FY 08
System Study	*Requirements and Technology Assessment*				
Technology R&D		*Concept & Component Development*			
System Demos			*Candidate System Feasibility Tests*		

8 – Spectrum Research

Problem Statement:

Demands on aviation spectrum are increasing as aviation traffic increases and as new ATM concepts are developed and implemented. Simultaneously, interests external to aviation threaten to encroach on or reduce spectrum allocations currently assigned to aviation.

Product Description:

Research and technical support for the efficient use and protection of aviation spectrum

- Coordinate long-term aviation spectrum planning support
- Technologies for 5091-5150 MHz band
- Technologies for efficient use of spectrum
- Coordinate spectrum consequences/impacts/issues across NExTNAS-CNS research sub-projects

Objective:

Perform research and development on improved spectrum efficiency to meet current and long term aviation requirements, and coordinate and collaborate with relevant aviation spectrum authorities to protect aviation spectrum resources.

Schedule:

Tasks	FY 04	FY 05	FY 06	FY 07	FY 08
System Studies	◆				◆
Near-Term Planning	◆	*WRC-07 Preparation*		◆	
Long-Term Planning	◆				◆

9 – Surface ICNS Network

Problem Statement:

Current surface systems:

- use VHF communications for voice only (no data) that have limited capabilities to enable future system automation and decision support systems;
- use an aging obsolete physical communications infrastructure that is vulnerable to outages and costly to maintain and upgrade.

Objective:

Develop and demonstrate a wireless surface integrated CNS network prototype that enables:

- transfer of mission critical airport voice/data among users and service providers;
- transfer of non-critical information among aircraft, tower, airport, airline operators;
- interoperability with existing and future systems;
- required redundancy and reliability;
- scalability, flexibility and upgrades

Product Description:

Prototype surface integrated CNS network.

- Optimum system-level architecture for surface integrated CNS network;
- Research and development of wireless transmission and data network technologies;
- Prototype surface ICNS network demonstration.

Schedule:

Tasks	FY 04	FY 05	FY 06	FY 07	FY 08
ICNS Network Approach	*Surface ICNS Network Design*				
Component/System Prototypes		*Prototype Development & Evaluation*			
System Demo				*ICNS Network Demonstration*	

10 – CNS Technologies

Problem Statement:

High payoff C, N and S technologies with the potential for major advancements in NAS performance are inadequately investigated due to limited resources.

Objective:

A portion of NExTNAS CNS research will be devoted to identifying promising technologies and concepts that have a potential to significantly improve NAS performance, and applying initial R&D to investigate feasibility and potential benefits.

Sound cost-benefit analyses are required.

Government-industry partnerships are desired.

Product Description:

Initial R & D to determine feasibility and potential benefits of selected high-payoff CNS technologies. Examples:

- Advanced antenna technologies
- Technologies for advanced landing capabilities
- GPS augmentation/backup technologies
- ADS/TIS research areas

Schedule:

Tasks	FY 04	FY 05	FY 06	FY 07	FY 08
Identify, review, select CNS Tech	*Identify, review and select candidate CNS technologies for research*				
Research, Studies		*Research and Development*			
Technology evaluation			*Evaluate results, recommend follow-on*		

Modeling & Simulation, Test & Demonstration Matrix

Very Probable Requirement

Probable Requirement

Possible Requirement

No Requirement

	Modeling/d Simulation	Testbed - Components	Testbed – System	Testbed – external cnct	Ground mobile demo	Flight demo cooperative	Flight demo – NASA only	Systems Analysis
Transitional CNS Architectures								
Global A/G Networks								
Space-based Surveillance								
Oceanic C&S								
Mutli/Multi Avionics								
VHF Systems Optimization								
Terminal Area Comm								
Spectrum Research								
Surface ICNS Network								
CNS Technologies								

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

PRESENTATION OUTLINE:

- *Background and Genesis of NExTNAS-CNS Ideas*
- *NExTNAS CNS Project Overview*
- *List of Proposed Subprojects*
- *Subproject Descriptions*
- *Procurement Strategies*
- *Summary*

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

NExTNAS-CNS Project Procurement Strategies:

- NASA Research Announcement or other competition for a large task contract
  - *Primarily applied to large tasks, likely to be one prime with several subs*
- Cooperative R&D Agreement (CRADA)
  - *Desired by the government, most appropriate for technology developments where marketable products may result*
- Small business task order contract (IDIQ)
  - *A current 5-year contract (started January 2003) includes six small businesses, will be appropriate for some tasks*
- Regular competitive procurement through request-for-proposal (RFP) process
  - *Appropriate for work that doesn't fit into other procurement vehicles, such as specific technology developments, or for tasks with multiple awards.*
- Grants
  - *Generally for lower TRL research*
- Space Act Agreement
  - *Will likely only be used in the form of non-reimbursable agreements for cooperative partnerships*
- Federally Funded R&D Centers (FFRDC)
  - *Non-profit R & D organizations that have unique qualifications and relationships*

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

PRESENTATION OUTLINE:

- *Background and Genesis of NExTNAS-CNS Ideas*
- *NExTNAS CNS Project Overview*
- *List of Proposed Subprojects*
- *Subproject Descriptions*
- *Procurement Strategies*
- *Summary*

NExTNAS-CNS Project
NASA Exploratory Technologies for the NAS

NExTNAS-CNS Project Presentation Summary:

- NExTNAS-CNS Project is a new FY04-FY-8 Project within NASA's Airspace Systems Program

- The Project's Goal is to identify and begin the transition of NAS CNS systems to a high-performance network-centric digital CNS infrastructure, while addressing near/mid-term issues within this transition context.

- Ten sub-projects are proposed
  - to be reviewed at this workshop,
  - to be substantially defined during the first year of the project,
  - representing a balance of near, mid, and far term research,
  - with a goal of several "high-TRL" products intended to be ready for the start of an implementation process by the end of the project.